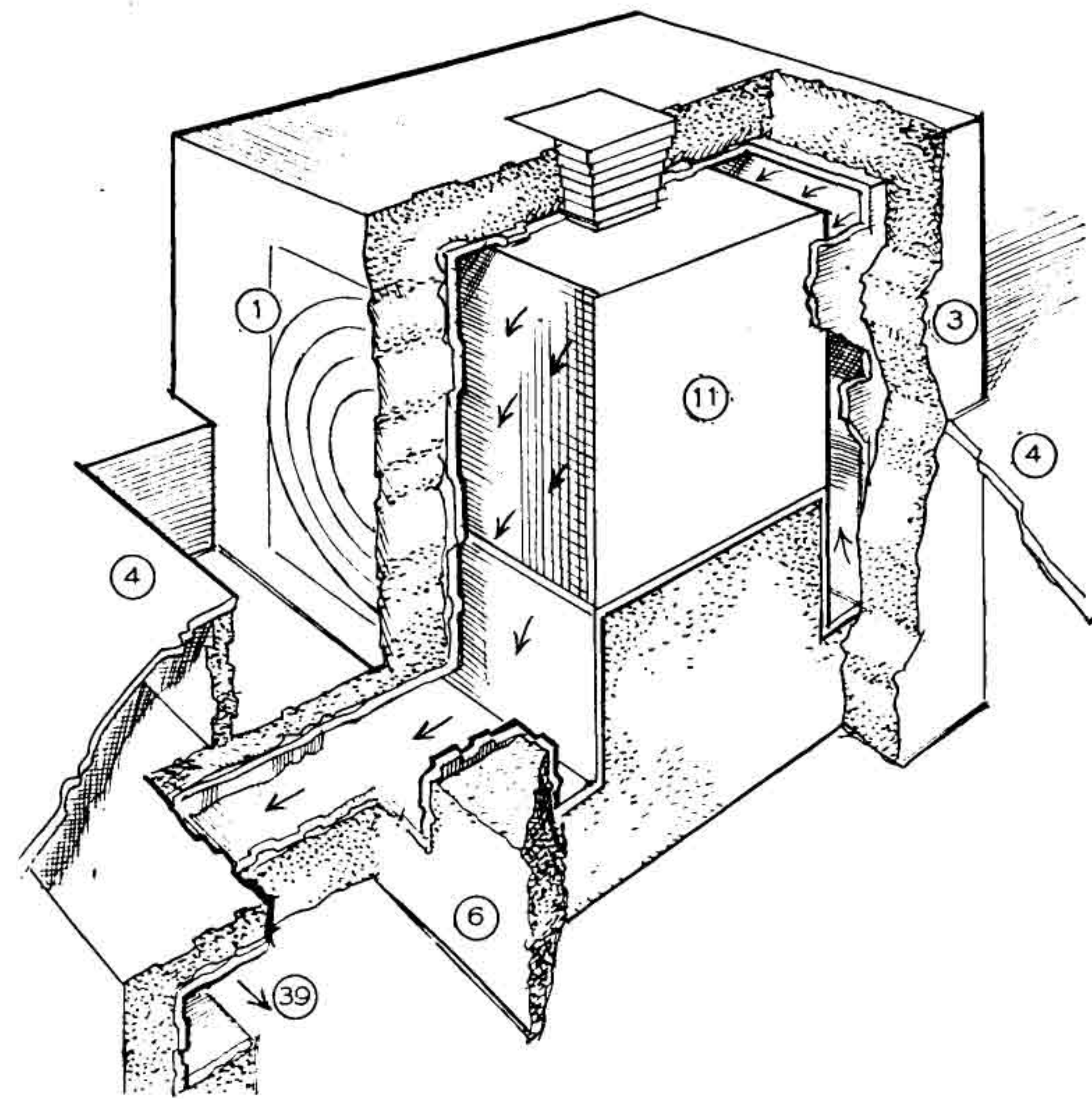


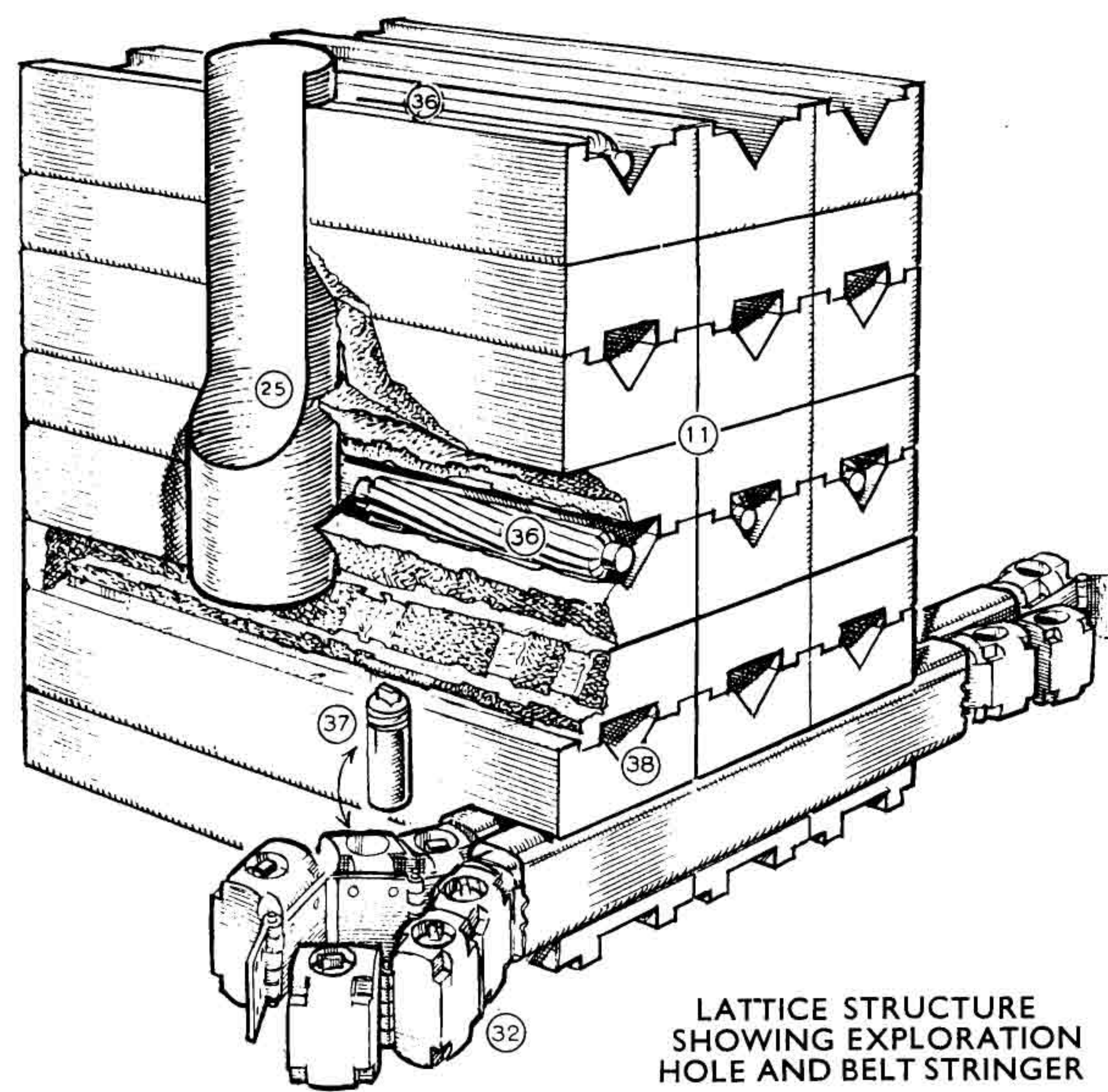
# The World's Reactors

## No. 1—BEPO

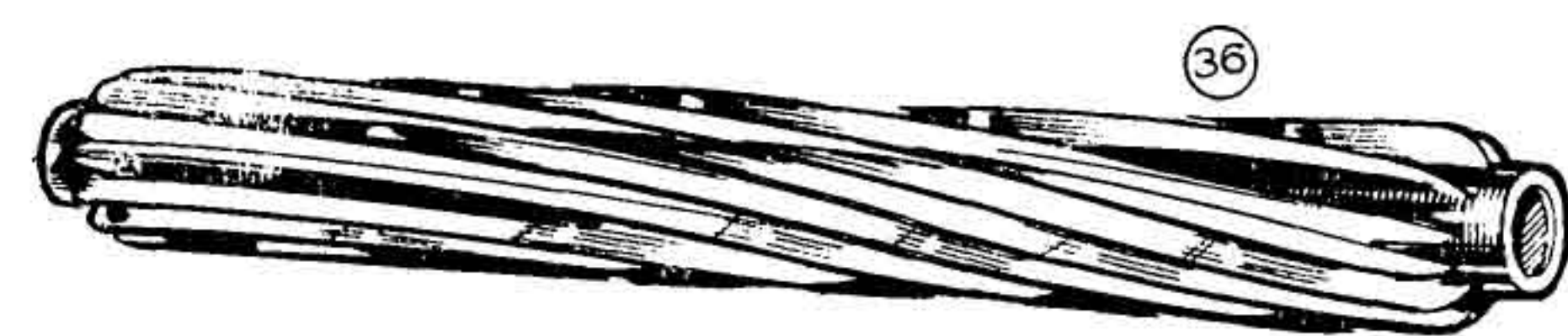
- | KEY                   |                     |                                 |                              |                            |                                    |  |
|-----------------------|---------------------|---------------------------------|------------------------------|----------------------------|------------------------------------|--|
| 1. Load face          | 8. Stepped plug     | 15. Cast iron floor             | 21. Shut-off rod jacks       | 28. Pinion operating motor | 35. Vacuum decontamination machine |  |
| 2. Unload face        | 9. Air space        | 16. Steel plating               | 22. Jack covers              | 29. Ionization chamber     | 36. Fuel element                   |  |
| 3. Control face       | 10. Bridge section  | 17. Sniffer cabinet             | 23. Jack operating cylinders | 30. Lead coffin            | 37. Isotope can                    |  |
| 4. Main floor level   | 11. Graphite blocks | 18. Sniffer mechanism           | 24. Experimental probe       | 31. Belt stringer control  | 38. Fuel and coolant channels      |  |
| 5. Load platform      | 12. Thermal column  | 19. Shut-off rods               | 25. Experimental holes       | 32. Belt stringer          | 39. Outlet duct                    |  |
| 6. Concrete shielding | 13. Lead door       | 20. Shut-off rod shock absorber | 26. Control rods             | 33. Lead trolley           |                                    |  |
| 7. Cast iron          | 14. Bismuth         |                                 | 27. Rack and pinion          | 34. Mortuary               |                                    |  |



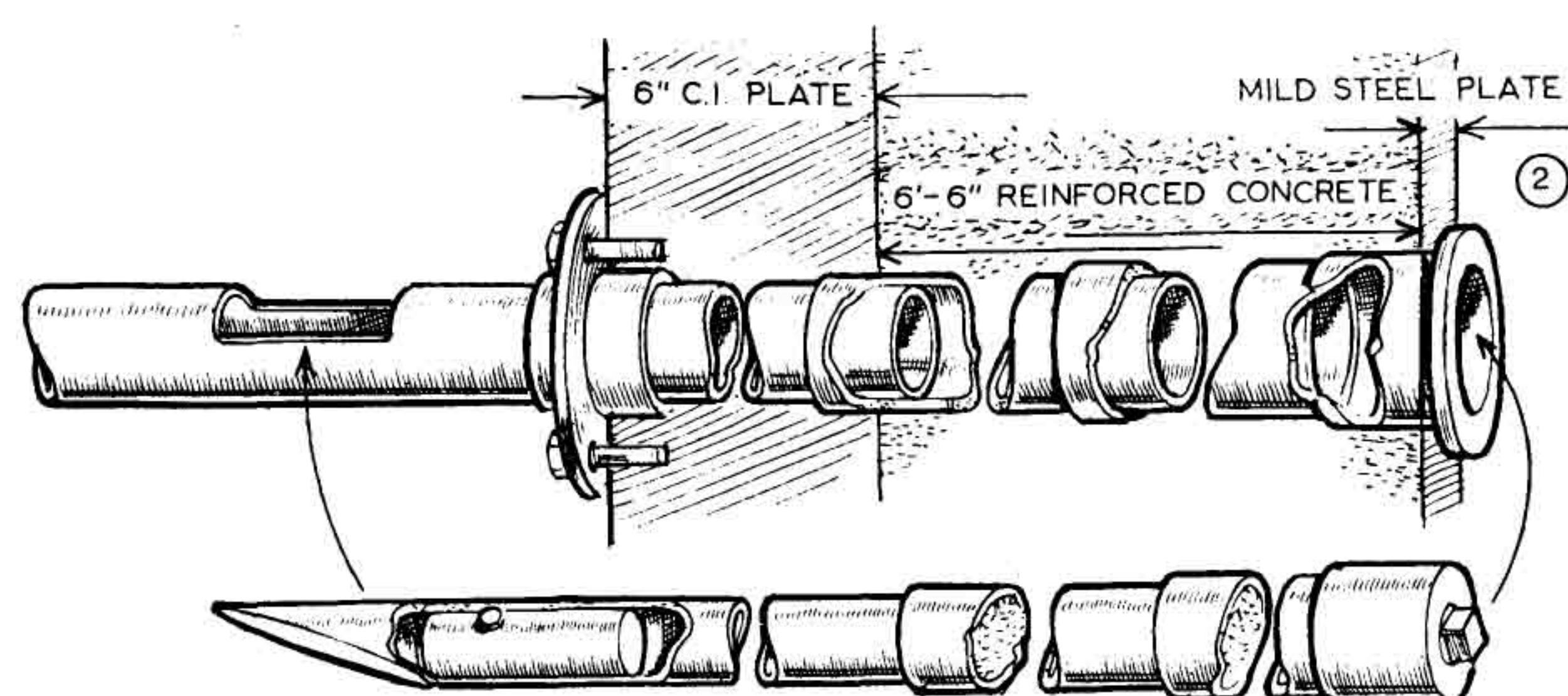
DIAGRAMMATIC PICTURE OF PILE



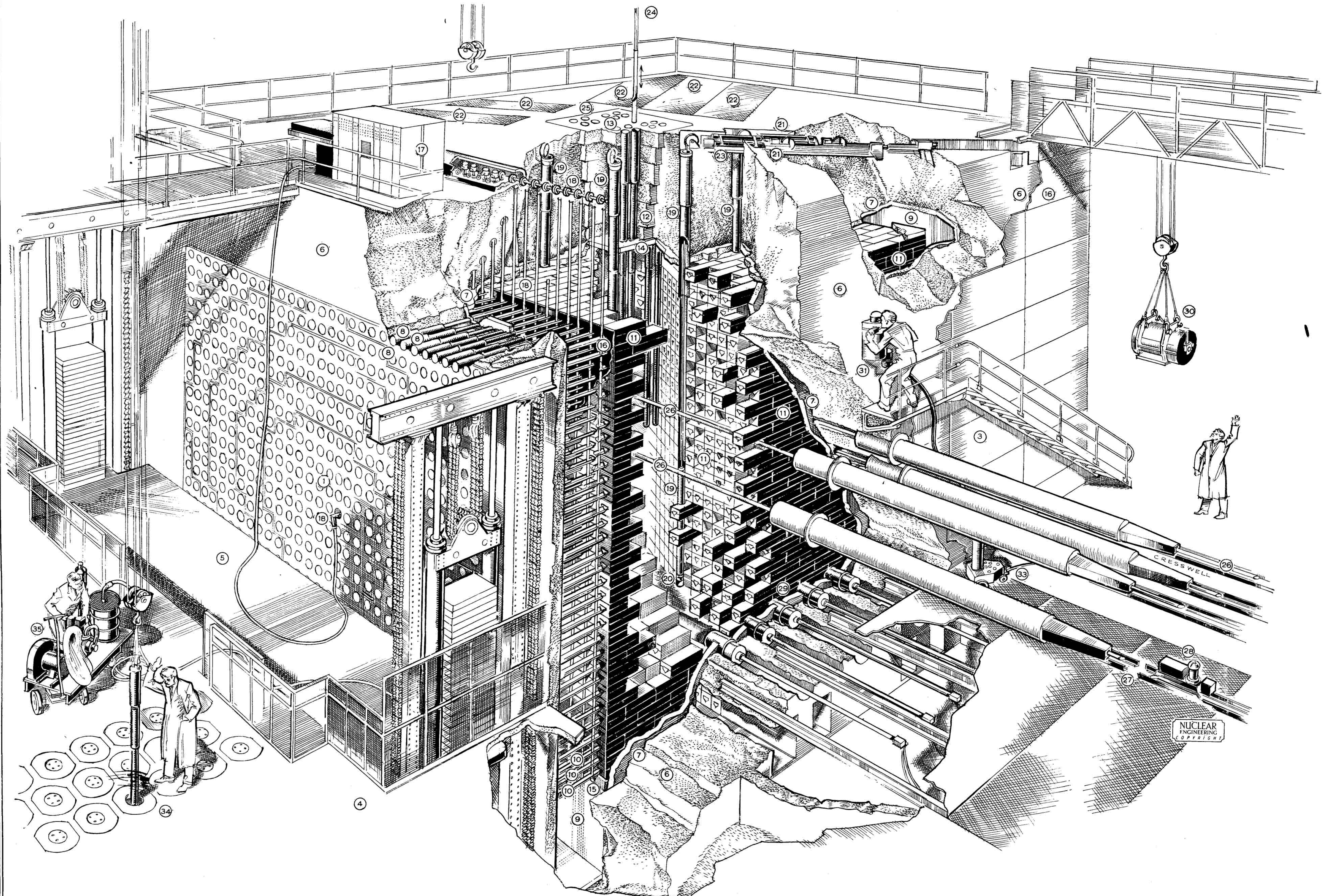
LATTICE STRUCTURE  
SHOWING EXPLORATION  
HOLE AND BELT STRINGER



FUEL ELEMENT



AIR INLET VALVE ON EACH COOLANT CHANNEL



NUCLEAR  
ENGINEERING  
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# The World's Reactors No. 1

## BEPO—BRITISH EXPERIMENTAL PILE

TYPE:	Thermal heterogeneous.
PURPOSE:	General research using pile radiations. Routine production of radio-isotopes. Some low-power engineering loop experiments.
LOCATION:	Harwell, near Didcot, Berkshire, England.
OPERATION:	Commenced operation July 5, 1948.
FUEL:	Natural uranium. U as cast bars, 0.9 in. dia. 12 in. long, Al clad. Elements laid in stringers of 20 per coolant channel. Reacting core: 20 ft. dia. x 20 ft. long. Total number of fuel channels: 900. Charge for criticality: 28 tons. Charge for operation: 40 tons. Maximum fuel temperature: 250° C.
FUEL CANS:	Pure aluminium, 99.5 to 99.7% purity. Wall thickness 0.025 in.; helical longitudinal fins. Sheath temperature 200° C.
MODERATOR:	Graphite. Form: mainly machined blocks, 7¼ in. x 7¼ in. x 29 in. Total wt.: 850 tons. Geometry: cube 26 ft. on the side. Mean temperature: 95° C.
REFLECTOR:	Graphite: 3 ft. all round core.
LATTICE:	Regular square 7¼ in. pitch
LATTICE CONSTANTS:	Thermal utilization factor ( $f$ ) = 0.8795. Fast fission factor ( $\epsilon$ ) = 1.0249. Neutron fission factor ( $\eta$ ) = 1.276. Resonance escape probability ( $p$ ) = 0.9200. Infinite multiplication factor ( $k_{\infty}$ ) = 1.0587. $L_s = (\text{slowing-down length})^2 = 410 \text{ cm.}^2$ $L_d = (\text{diffusion length})^2 = 303 \text{ cm.}^2$ Critical buckling for bare pile ( $B^2$ ) = 0.825 $\text{m.}^{-2}$
COOLANT:	Air. Inlet: from atmosphere through filter. Outlet: through filter and suction pump. Pile pressure: about 60 in. water. Inlet coolant temperature: atmospheric. Outlet coolant temperature: 90° C.
PUMPING:	Pumping equipment: five 1,400 h.p. (11,000 volt) exhausters. For full power working: three operative. Air flow: 150,000 c.f.m. approx. Inlet filter: cotton wadding. Outlet filter: oil-sprayed glass-fibre mats.
POWER:	Normal operating power: about 6.5 MW heat. Recovery: 1 MW via heat exchanger for space heating.
FLUX:	Maximum thermal neutron flux: about $1.5 \times 10^{12}$ , n/cm. <sup>2</sup> /sec.
CONVERSION:	U <sup>238</sup> to Pu <sup>239</sup> . Conversion factor approx. 0.75.
BURN-UP:	One charge of fuel will last five to ten years.
REACTIVITY:	Excess reactivity: 1.4%, freshly charged.
CONTROL:	Shut off rods: 10. Control rods: 4. Rod construction: B <sub>4</sub> C-filled 2 in. steel.
SHIELDING:	Six in. thick cast iron thermal shield backed by barytes concrete biological shield 6 ft. 6 in. thick. Weight of shielding: about 5,000 tons. Thermal shield: 600 tons in addition to above.

*A limited supply of separate copies is available of this series of data sheets on various reactors built or projected throughout the world. Copies may be obtained from the publishers, Temple Press Limited, Bowling Green Lane, London, E.C.1, at the cost of packing and postage only (4d. each).*